BOOK 4

EVS

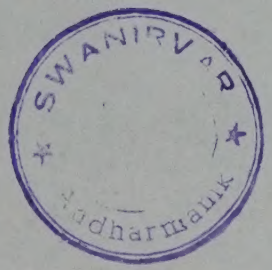
SKM-71

LAND AND WATER

347

... to raise a good crop of plants, the land must carry an adequate supply of moisture. It must have the ability to store it without leaching. To do so it must be well supplied with humus built into it by the plants and small living creatures of the soil. It is commonly estimated that nature may normally take as much as 500 years to build an inch of topsoil. The topsoil is one of the keys to man's existence on earth.

— John F. Storer



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199

LAND AND WATER

In the English language the name of our planet is Earth. We also use the word "earth" for the land on the surface of the planet. This is so in many languages. Can you suggest why? Perhaps, this is because the land is the planet's first resource. That is why in ancient times, in some parts of Northern India, a king was known as a Bhoomipal or "Guardian of the land".

Land use

There are many conflicting demands on land. For instance, a school may have to decide how to use the land in its compound: to build more classrooms, to make a football field, or to have a garden of grass and flowers. This is a difficult decision because the amount of land within a school compound is limited. For each country, and for the world as a whole, the land is a limited resource. We need land for forests and trees, for grazing grounds and agriculture. We need land to establish industries and to build houses, to lay roads and train lines. Think about the different ways in which land is used in your neighbourhood.

SWANIRVAR
Estd:
Adharpanik

The soil

Land and water are closely interconnected. The surface of he earth is covered by a layer of rock particles and rotting vegetation. This layer forms the soil. The soil provides a base for plants to grow and supplies nutrition to them. At the same time, the roots of trees and plants help to hold loose soil together. The vegetation also helps the soil to absorb and store rain water. The water seeps into the pores of the soil and the cracks in the rocks below, from where it is released gradually into springs and wells.

All animal life depends on the plants that the soil supports. We need good soil to grow our food. So, we could say that our life depends on how we manage the soil.

Erosion

Plant roots bind the soil. Look at the binding of any of your school books. How are the pages held together? They may be stitched with thread, or stapled or glued together. If a part of the binding were damaged, the book might still be held together by the remaining part of the binding. But if too much of the binding is damaged, the pages would soon fall apart, and there would be no book.

Similarly, the soil is disturbed when natural vegetation, the trees and plants, are cut away. The topmost part of the soil, called the topsoil, may get detached. The topsoil from land where vegetation has been cleared is carried away usually by water and sometimes by wind. It then gets deposited some where else.

We can see this happening very clearly on a mountain slope. When the trees are cut down, rain water carries the exposed topsoil with it. So, the slope is eroded. An eroded slope is likely to get even more damaged. This leads to a whole section of the mountain side slipping downwards in a *landslide.*

A landslide in the mountains often occurs suddenly. But when soil is eroded from cultivated fields, the process is very slow and we may not even notice it. The amount of soil that is lost depends on the kind of soil, the terrain, the climate, and the local agricultural practices. For example, when crops are grown on a steep slope, the process of erosion is quicker Therefore in the hills, fields are cut in horizontal terraces to reduce the loss of soil. When trees are grown along with crops on a piece of land, the trees help to hold the soil together.

In India, between 5,000 and 6,000 million tonnes of topsoil are carried away every year from our fields. Nearly one third of this detached soil, called *silt*, is deposited in the sea, and one tenth in reservoirs. Silt reduces a reservoir's depth and its capacity to hold water. When too much silt is deposited in river beds, they become shallower, and may overflow causing *floods.*

Because the rain water runs off an eroded slope quickly, very little water seeps into the ground. The result of this is that the underground streams which feed wells and springs become dry. If the next monsoon is poor or fails, then fresh water becomes very scarce and there is a *drought.*

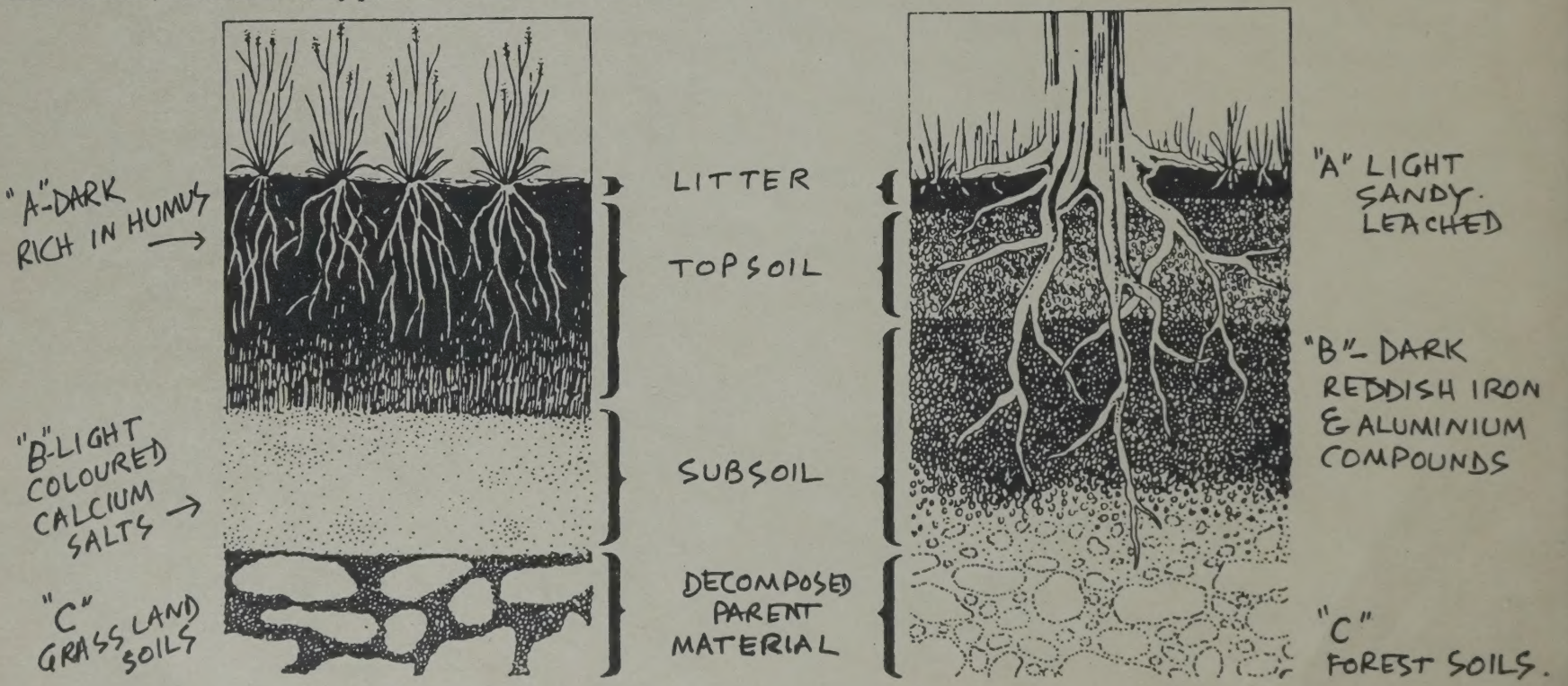
Although floods and droughts may both be caused by natural climatic changes, their impact is worsened by human mismanagement of land and water, Extensive deforestation, very intensive grazing or cultivation, and indiscriminately digging up the land for mining ores are some forms of mismanagement. These can result in fertile land becoming *wastelands,* in which nothing grows.

Soil Fertility

The fertility of soil depends on its depth, its physical quality and the useful elements (which are called *nutrients)* in it. The *alluvial* soil in the major river valleys and deltas is rich topsoil which has been carried down by the rivers, and deposited on their banks. Many great civilizations such as that of the Indus Valley and of Mesopotamia have developed in fertile river valleys.

When we look at a dense, luxuriant forest, we might think that its soil is very fertile. But actually, this is not so. All the richness of a forest is contained in the trees themselves. If the trees of the forest are cleared, and the land is exposed to the sun, the soil becomes very dry. Some forest soils, which contain aluminium and iron, become hard. Hardened soil, called *laterite,* is found in many parts of India, for instance in some areas of Andhra Pradesh. No vegetation will grow on laterite, and it is very difficult to make such land fertile once again.

Can you think why this happens? The rich part of a forest soil is actually the layer right on top of the soil, which consists of fallen leaves and other rotting vegetation, called *humus.* In a dense forest, the humus decomposes very slowly, gradually releasing valuable nitrogen, along with other essential minerals to sustain both plant and animal life. If the trees are cut and the sun shines on the forest floor, the humus begins to decompose very quickly and all the nitrogen is lost to the air. That is why it does not always make sense to cut a forest to grow crops.



COMPARISON OF GRASSLAND & FOREST SOIL SHOWS HOW EASILY THE TOPSOIL CAN BE ERODED ONCE THE TREE COVER IS GONE

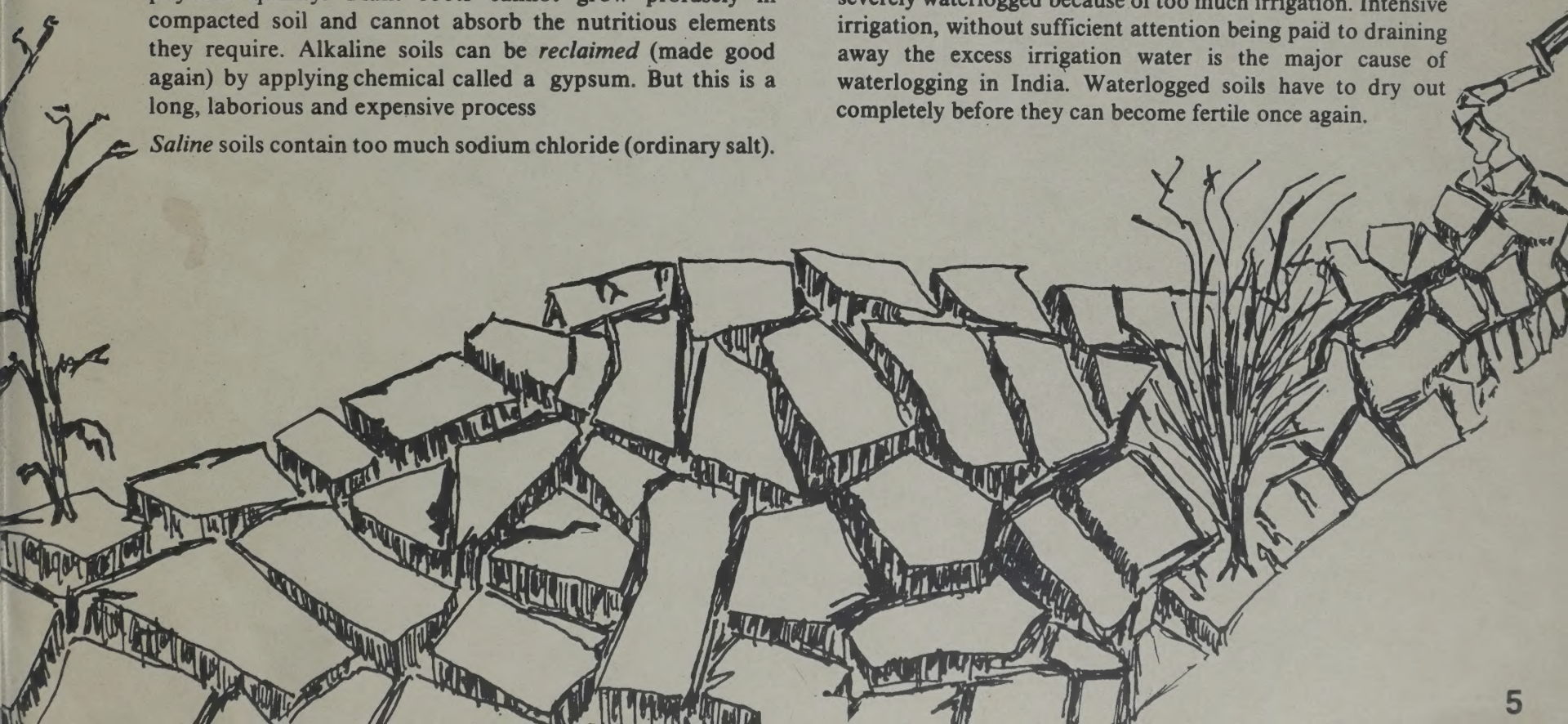
Salt-affected land

Many of our cultivated fields are less fertile than they could be, because of the special problems created by the quantity of different *salts* present in the soil. These include the chlorides, sulphates and bicarbonates of calcium, sodium and magnesium. Some of these salts are necessary for plants, but too much is bad. All water, even fresh water, contains dissolved salts, which seep into the soil with the water.

Some soils contain too much *alkaline* salts—sodium carbonate (soda) and sodium bicarbonate (baking soda). These make the soil particles stick closely together and the soil becomes compact. A hard whitened layer of lime or "kankar" may also form on top of this soil. An alkaline soil is poor in its physical quality. Plant roots cannot grow profusely in compacted soil and cannot absorb the nutritious elements they require. Alkaline soils can be *reclaimed* (made good again) by applying chemical called a gypsum. But this is a long, laborious and expensive process

Saline soils contain too much sodium chloride (ordinary salt). Excess sodium chloride in the irrigation water or in the soil itself, as in the coastal areas near the sea, reduces a plant's capacity to absorb water. Plants which grow in saline soils are rather like the mammals of the saline oceans—thirsty for fresh water.Saline soils can be reclaimed more easily than alkaline ones, by washing away the excess salt with plenty of fresh water.

Too much water, without proper drainage, is also a problem. It causes the water to collect in one place, and the soil becomes *waterlogged.* Such soil does not have enough air in it. Without air, the oxygen level in the soil falls and the carbon dioxide increases. Plant roots need a well-aired soil. They cannot grow in waterlogged land. The black cotton soil around Hoshangabad, in Madhya Pradesh, has become severely waterlogged because of too much irrigation. Intensive irrigation, without sufficient attention being paid to draining away the excess irrigation water is the major cause of waterlogging in India. Waterlogged soils have to dry out completely before they can become fertile once again.



Land may also become infertile when the same crop is grown over and over again in the same area, depleting the soil of specific nutrients. That is why traditional agriculture avoids mono culture (growing one crop in a season. Two different kinds of crops, such as mustard and wheat, may be grown together. Growing two crops, such as a cereal and a pulse, in rotation on the same field, is another way of conserving the nutrients in the soil. In some parts of India, parts ofa farmer's fields in turn are left *fallow,* (uncultivated) for a season. This helps the soil recover any deficiency of a particular nutrient.

In recent times, the quality of soils have also been affected by the large quantities of pesticides, fertilizers and other chemicals used in modern agriculture. Chemical wastes, which are discharged from industries into rivers, not only pollute the water but can also affect the soil, if the river water is used for irrigating fields.

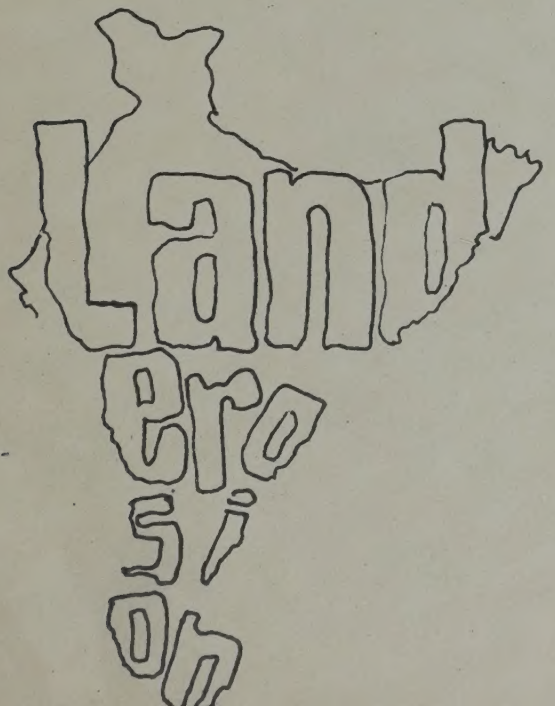
Land and water are part of the web that supports life on earth. In order to protect our land and water resources we have to find a way in which some part of the land is left thickly forested, while other parts are used to produce food on a sustainable basis.

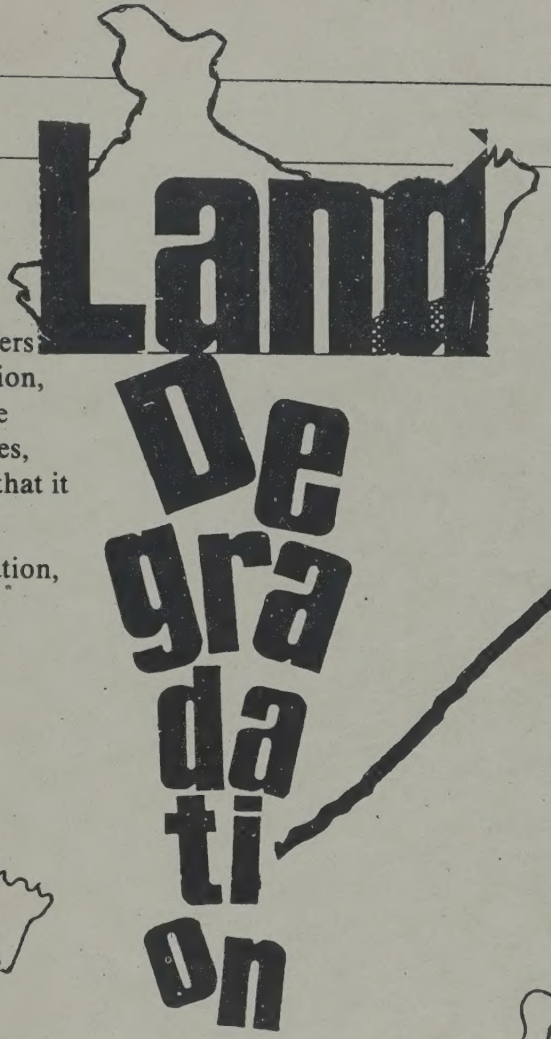
Activity 1

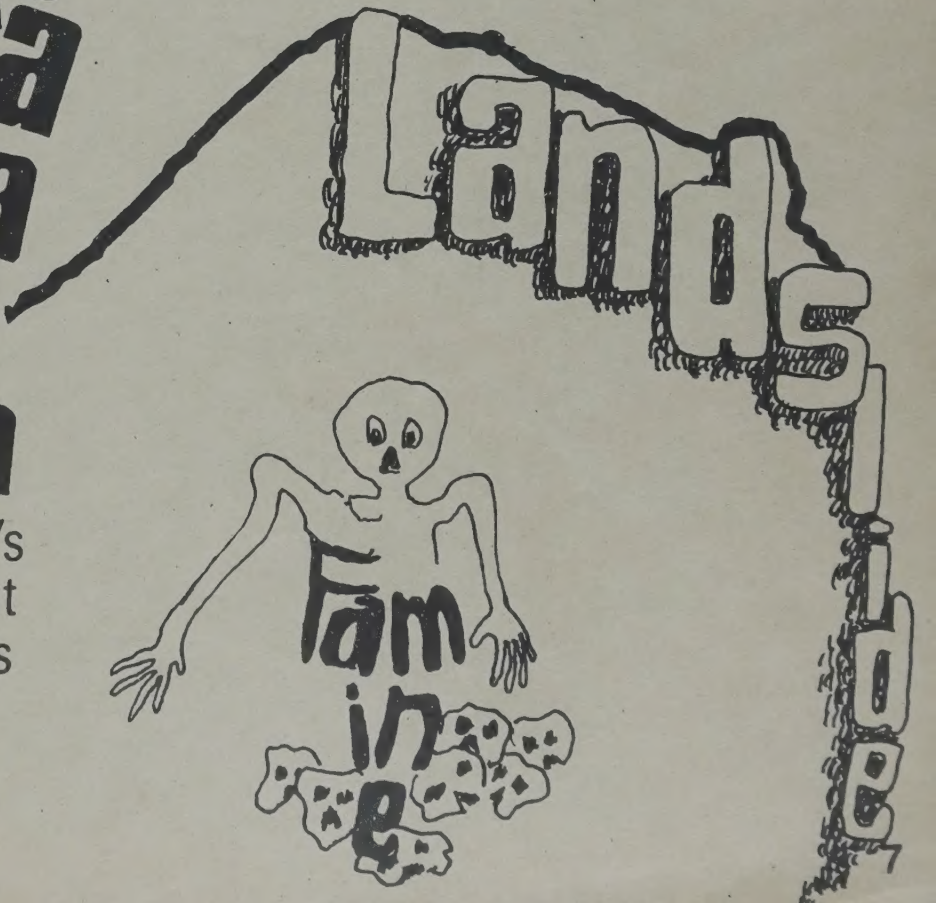
Landslide

This is the cover of a report on Land Degradation.* Collect articles from newspapers and magazines on issues related to land-erosion, landslides, drought, floods etc. Using the headlines, or making up your own headlines, arrange the words and letters in such a way that it depicts the problem.

* Centre for Education and Documentation, Suleman Chambers
4, Battery Street, Behind Regal Cinema,
Bombay 400039







Activity

Goats and Grass

India has one fortieth of the world's land area, but half of its buffaloes, 15% of its cattle and 15% of its goats, besides 4% of its sheep. This livestock pulls carts and ploughs, provides manure, milk, meat, and other products. But there is simply not enough grazing land and fodder for these animals. So they eat rice and wheat straws and scrounge for any edible vegetation.

Indian livestock has adapted to this situation of scarce food; the animals are hardy but their growth and yield is low. Overgrazing of land leads to desert-like conditions, and the people who depend on animals for their livelihood suffer because there is even less food for the animals and themselves. The people have to take their animals further and further to look for grazing grounds. The number of goats (which are the hardiest of all the animals) tends to increase, as the larger and more productive livestock become fewer.

In harsh deserts or mountain areas, animal husbandry and nomadism are more secure occupations than agriculture. In a drought, the crops in Rajasthan may fail almost completely, but the livestock will produce about half the normal amount of wool and milk. Pastoral nomads migrate over routes which their ancestors have taken for centuries. But this is now becoming difficult, and conflicts arise between nomads with their cattle and the settled villagers, as both compete for scarce resources.

Where in India would you find these?

a) Temperate grasslands (green throughout the year)
b) Steppe (sparse grass during a brief wet season of a month or two)
c) Savannas (grassy plain with some growth even in the dry season)

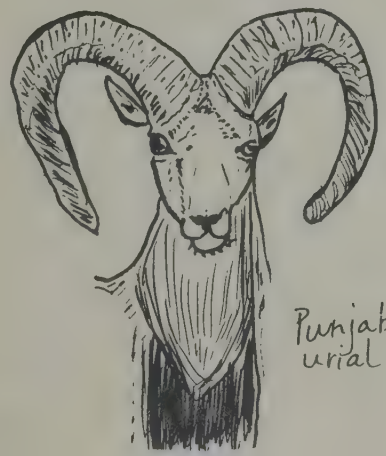
Play in groups of six—use your imagination freely. *Play the funny goat game.* Each player writes the name of an imaginary goat on a strip of paper, folds the paper to hide what is written and passes it on to the next player. Now each writes where the goat is, folds the paper a second time and passes it on. The following rounds are completed in the same way, with players writing: what the goat is doing, how it is doing this; why it is doing so; and finally, what the result is. When the paper is folded for the sixth time and passed to the next player, each will have the paper that he/she started with. Open and read out, in turn.

Himalayan tahr

Wild goat

Kashmiri markhor

Bharal (blue sheep)



Punjab urial

Just yesterday, it seems
the fields were full of grain
Just yesterday, the water
came from heaven
and the earth was not athirst
But yesterday is five years gone
And today is nought but rubble
a wildeerness of earth
baked brown by the relentless desert sun

Amit Jayaram

Activity 3

A Fight for Life

I am the Sarpanch of the village Balwara in the district of Dungarpur in Rajasthan. We are tribals and normally we live by gathering food from the forest. We do very little agriculture because we do not own much land. For many years now, because the forests are diminishing, we have been living by doing odd jobs to earn money and buy food. For three years there has been a severe drought in our area and food has become too expensive for us to buy. People are starving and because they are weak they are falling prey to diseasess like T.B. and malaria.

The Rajasthan Government started work like digging tanks and making roads, and employed the people to do this. This is now our only source of money. But although people have worked for one or two months they have not received any wages. The merchants are exploiting us by charging high prices for wheat and other necessities. So, it is a grim battle.

If I had the power, the first thing I would do is to get food for the village. Previously the Central Government was giving each person 15 kilos of wheat at a controlled rate. But now they have made it eight kilos. I would fight with the Government and make them realise that we need more wheat. I would also ask the District Collector to devise a system by which money for wages is given to the villagers promptly. Some Sarpanches and other officials cheat the people by taking the money for themselves. I would keep a strict vigil and get the magistrate to punish such people at once. If the villagers get employment and food, they will not be prey to diseases. For those who are already sick, I will get the nearest primary health centre to provide treatment and medicines.

So that we do not have to face these problems year after year, I will discuss with the villagers that we can do to help ourselves.

—Sandeep Krishna
Springdales, Dhaula Kuan

This passage was written as part of the Civics work by a child in Class VI. The assignment was: Find a newspaper report on the drought, and imagining that you are the Sarpanch of a village in the affected area, write what you would do.

This can be modified for any current environmental problem—lack of drinking water in an area of floods. The information comes from the newspaper report, but is used imaginatively so that children can visualise the impact of a problem even if they themselves are not affected by it.

Activity 4

On The River Route

The river enters the district at a height of some 710 feet, and leaves it at about 630 feet above the level of the sea, with a course within the Delhi limits of rather over 90 miles and an average fall of between 10 and 11 inches to the mile. The general direction is ... nearly due south. In the floods of the rainy season the river has a considerable breadth swelling in places to several miles with a maximum depth of some 25 feet. In the cold weather its normal depth is said to be four feet only; the stream is only sufficient to supply the three canals which draw from it (the eastern, and the western Jamna, and the Agra Canal) and is then fordable in many places. The banks of the river are generally low, and the bed sandy, but there is said to be a bed of firm rock' under the site of the Agra Canal weir at Okhla. It passes close under the Fort at Delhi, and it must always have rounded the Eastern point of the rocky 'Ridge' at Wazirabad. But in the northern part of the district it appears formerly to have had a course much to the West of that which it holds at present. The drainage channel called the 'Budhinala', which comes down under the very doors of Sonipat, would seem by the conformation of the country to have been the old bed of the Jamna, and this is supported by strong and general tradition.

— Oswald Wood, 1870s

* From *"Historic Delhi"* by H.K. Kaul, Oxford University Press, 1985

Trace the course of a river through a district, marking the places at which water is drawn out of it (for irrigation or other purposes) and the places where waste water drains into it.

Notice also whether and how the river has changed its course.

Help children to learn about their own surroundings. This unit could be combined with work on Pollution booklet 9 and children could mark the pollution points on the river.

Activity 5

Footprints on the Land

"How did civilised man despoil this favourable environment? He did it mainly by depleting or destroying the natural resources. He cut down or burned most of the usable timber from forested hillsides and valleys. He overgrazed and denuded the grasslands that fed his livestock. He killed most of the wildlife and much of the fish and other water life. He permitted erosion to rob his farm land of its productive topsoil. He allowed eroded soil to clog the streams and fill his reservoirs, irrigation canals, and harbours with silt. In many cases, he used and wasted most of the easily mined metals or other needed minerals. Then his civilisation declined amidst the despoilation of his own creation or he moved to new land.

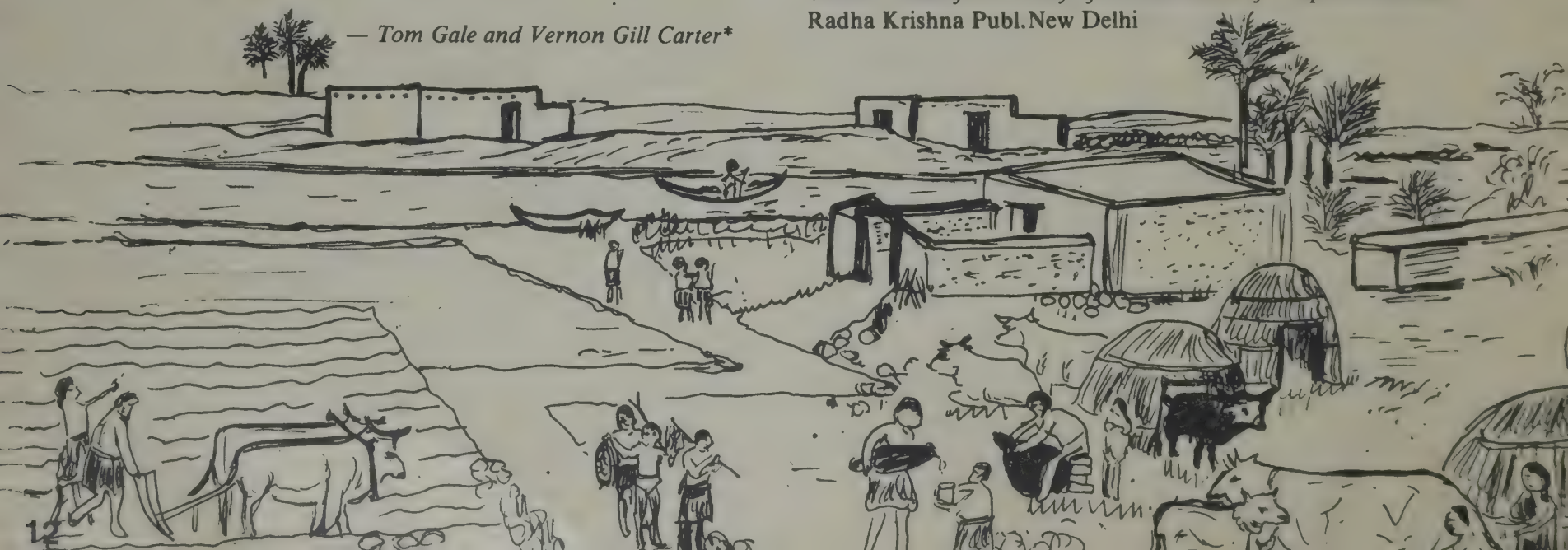
— *Tom Gale and Vernon Gill Carter**

Refer to a school history text book which describes the Mesopotamian, Indus Valley (Harappan) or other river valley civilisation. Has the writer noted how human beings changed their environment? Could the silting or water logging of ancient irrigation systems have been one of the reasons for the fall of a civilisation?

Have a class discussion on this subject.

Encourage children to look at history from an environmental point of view. Point out, however, that in many cases we may not know for sure what the reasons for the fall of a civilisation were, but we can make intelligent guesses based on the information we have.

(* From *Topsoil and Civilization,* quoted by E.F. Schumacher *Small is beantiful: a study of Economics as if People Mattered* Radha Krishna Publ. New Delhi



Activity 6

Success on the Mountain

Sukhomajri is a small village on the banks of the Sukhna cho (cho means mountain stream) in the Shivalik hills near Chandigarh. In the 1968 monsoon many of the village fields were washed down by a landslide into a deep pit.

At that time Sukhomajri was a very poor village. It had noi irrigation water and no electricity. The villagers had goats and cattle, but the hill slopes where the animals grazed were almost bare. Many of the men had to go out of the village to work in factories.

Meanwhile in Chandigarh, people were worried because the famous Sukhna Lake in the city was getting filled up with silt. The Sukhna cho was bringing the soil from the hills into the lake.

Government scientists in Chandigarh were asked to find a way to stop this. The Central Soil Salinity Research and Training Institute in Chandigarh decided that first the needs of Sukhna village should be fulfilled. Three small reservoirs were built to catch the rainwater. This provided drinking and irrigation water, and prevented the stream from flooding.

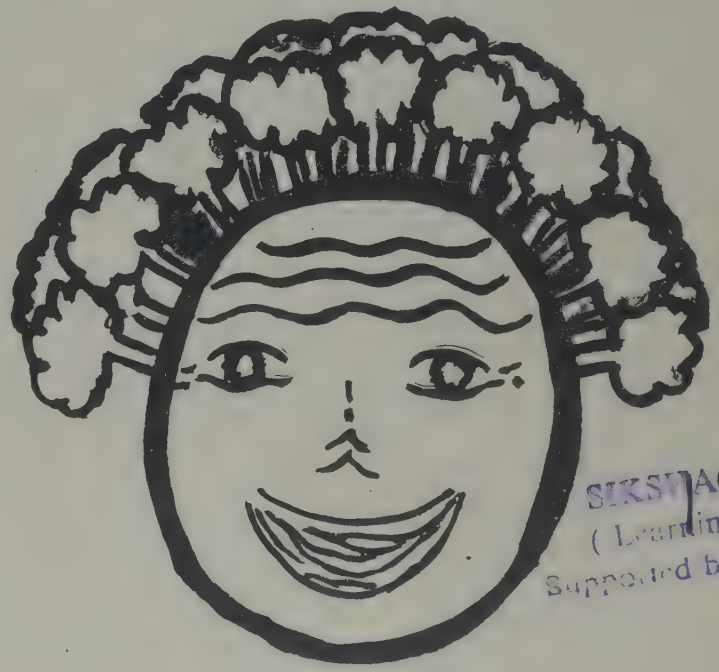
A system was also devised by which all the villagers got an equal share of water. Those who did not have fields to water could sell their share of the reservoir water to others. So everyone benefitted.

The villagers agreed not to graze their cattle on the hillside, but to cut grass from there to feed their animals, because this practice would be less damaging. Grass and trees were planted in the place where the fields had been washed away.

Instead of one crop a year, the villagers were then able to grow two and even three crops. The grass produced increased by 12 times. The silt in the Sukhna cho was reduced, and Chandigarh's Sukhna Lake was saved.

This success was not easy. It took nearly 10 years to achieve, and the Government spent a lot of money on Sukhomajri. But cleaning the silt from the lake cost even more money.

Do you think something similar should be done for every village with a problem? Do you think it can be done, and how?



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1997

What is watershed management?
Find out about traditional and modern methods of watershed management in India? Are there any success stories?

Activity

Why Natural Farming !

WASHINGTON September 9. The use of fertilisers does not necessarily lead to better farming than using natural agricultural methods, says a just-published report of the U.S. National Academy of Sciences. The academy's National Research Council appealed to the U.S. government to encourage more productive, environmentally benign farming practices.

For decades farmers around the world have been taught that the best way to increase crop yields is to use plenty of chemical fertilisers, and pesticides. In many countries including India, supplies of such chemicals have been subsidised by the government though in recent years environmentally conscious groups have strongly argued that natural farming techniques are just as good for farm productivity and positively beter for the environment.

The National Science Academy's report urges the U.S. Congress and department of agriculture to change existing farm policies and encourage the practice of natural farming techniques. It comes at a time when there is already widespread concern in this country about industralised agricultural practices which jeopardise the safety of food.

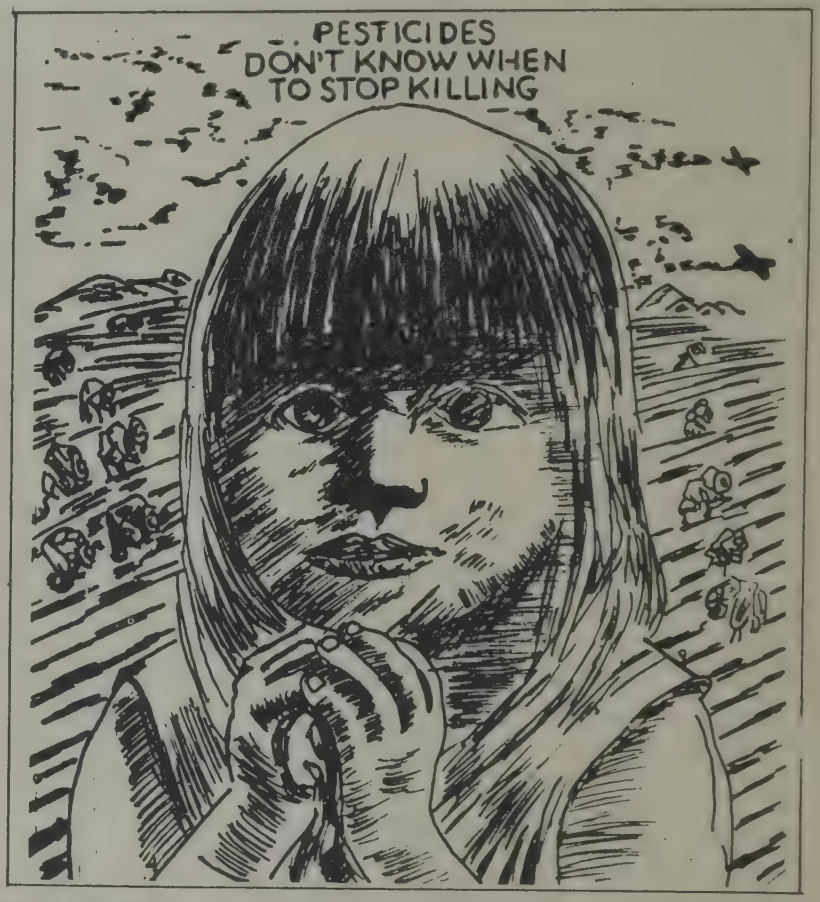
The report has already been attacked in industrial circles. The department of agriculture, however, has so far reacted favourably to it. The department runs an alternative agriculture research programme of its own.

Natural farming is not a single method but rather a variety of techniques, according to the report. These techniques have the common goal of reducing costs, preserving the environment and protecting human health by lowering or eliminating the use of toxic farm chemicals and drugs. Natural farming usually requires harder work and greater management skills than chemical-based agricultural practies.

A spokesman of the Washington based U.S. Fertiliser Institute has called the study "an insult to American agriculture and to the American consumer." He said that alternative farming could never be economically viable. He questioned the study's reliance on just 11 case studies of alternative farming and said that such practices could not be duplicated on a scale required to maintain food supply nationally at current prices.

At present, only five per cent of the 2.1 million farmers of the U.S. are believed to practice natural farming techniques.

—Gautam Adhikari
The Times of India



Use newspaper items as a starting point for discussions on current environmental issues. List all the natural methods that Indian farmers use, and the benefit of food grown in this way. Think about why the US Fertiliser Institute is not in favour of natural methods.

Read 4.7 and 4.7 a, and think about the options for India. Is ensuring the saftey of food less important than, more important than or equally important as increasing food production ?

Mitti Bachao

The Tawa Dam, which is a part of a Rs. 300 crore irrigation scheme, has been built at the confluence of the Tawa and Denva rivers, both tributaries of the Narmada. The dam in Hoshangabad district of Madhya Pradesh was expected to provide assured irrigation for 2.45 lakh hectares.

But it was soon clear that the irrigation — fed through canals was causing waterlogging in the retentive black cotton soil of the Hoshangabad area. In 1977, the farmers of the area launched the Mitti Bachao Abhiyan (Save the Soil Campaign). It was sparked off by the government charging the farmers excessive amounts for landshaping, a process needed to improve canal irrigation.

What was worse, the soil became severely damaged, as the sub-soil water rose, bringing harmful salts with it. Some seepage of water from the canals had been anticipated, but the engineers had not realised just how extensive the water logging would be.

Hoshangabad district has a high average rainfall, and farmers had traditionally depended on the rain to water their crops. Because the water table is fairly high, they could also sink tubewells. They cultivated jowar, sesame and cotton in the kharif season, and wheat in the rabi season. The rotation of these crops on the land, together with compost and manure, kept the soil fertile.

With irrigation, these crops were replaced by soybean, to be sold to a nearby factory which made soybean products. Because soybean has to be harvested at short intervals, farmers who were fairly well off began hiring labourers to do the work which they themselves used to do earlier. Some tribals found work as labourers.

The high-yielding seeds of soybean required fertilisers and pesticides. So, on the one hand, the productivity of the soil was being damaged by waterlogging, and on the other, its fertility was sought to be improved by adding chemical nutrients.

In 1979-80, the Auditor General of India reported that the production of rice, wheat, jowar, maize and gram had all fallen after the project had begun. A lot of effort is being spent to undo the damage of waterlogging. The Auditor General concluded that "the project was ill-conceived and benefits that were presumed would be available could not have been realised." The Tawa Dam is now an accomplished fact, but the Mitti Bachao Abhiyan continues.

Activity 7a

The Mystery Disease of Malnad

The health authorities in the Malnad area in Karnataka reported the appearance of a strange new disease in the 1970s. It caused painful joints and eventually crippling. Between 1969 and 1977, 200 people had been affected in 40 villages. All were poor Harijans. They were being poisoned by eating pesticide-infected crabs which they caught in the paddy fields when food was scarce.

In the years before the disease appeared, the landlords used to pay the labourers a part of their wages in food. In the late 1960s this practice was stopped. At the same time the farmers began planting high yielding varieties of rice and using pesticides like Parathion and Enderin to ensure a good crop. The labourers became more dependant on the crabs for food, even as the crabs became more contaminated with pesticides.

Washing and boiling, or cooking, removes some of the pesticide residue on food, but it cannot remove it all. Pesticide poisoning affects vital organs like the liver and the nervous sytem. In time, the pests too become more resistant to the pesticides, requiring even stronger doses.

Farmers have to control pests, in the field, and to protect their stored harvest. Pesticides are a relatively simple way of providing protection, but they have long term consequences for the environment and human health. We need integrated pest-management that is a combination of biological control (through organisms that prey on pests), pest-resistant plants and limited use of pesticides.

1
CHEMICALS ENTER AIR WATER AND LAND VIA AGRICULTURE AND INDUSTRY
2
SOME ARE HARMLESSLY BROKEN DOWN BUT SOME ACCUMULATE IN THE SOIL AND ON STANDING CROPS
3
THEY MAY BE ABSORBED INTO PLANTS.
4
... WHICH MAY BE EATEN BY GRAZING ANIMALS.
5
AND SO FIND THEIR WAY INTO FOOD.
6
AND SO POISON PEOPLE

Activity 8

Down the Mine

By world standards India is not very rich in mineral resources, except for iron ore and bauxite. Minerals are of three kinds—fossil fuels, metallic and non-metallic minerals. All three provide vital raw materials that go into a range of products that we use in our daily lives. The fossil fuels and the metallic minerals are concentrated in certain regions of the country. The non-metallic minerals are more evenly distributed. You can see this for yourself in the mineral maps in an ordinary atlas.

There are two basic methods of extracting minerals from the earth: open cast mining and underground mining. Both methods devastate the land. In open cast mines, the top layer of the earth is completely removed to expose the mineral "seam". This is drilled and blasted with explosives to break it up into rocks. The mineral-bearing rocks are transported away to extract the ore, and further drilling and blasting at the site produces another lot of rocks In underground mines tunnels are dug to the mineral layer. This is loosened by drilling and blasting and then brought to the surface. Some blocks of the mineral rocks are left undisturbed to hold up the roof of the mine. Small mines, such as stone quarries, may be completely manual, but mining for petroleum, for instance, requires sophisticated equipment. Badly mined areas are the most dramatic examples of land laid waste, polluting the water and air, and threatening the lives of the people who live and work near the mines.

You do not have to go down a mine to find out about it. You can work on a group project on a particular mineral. Some suggestions are given here.

1. *Mineral fuel*
   Coal
2. *Metallic mineral*
   Iron
   Manganese
   Bauxite
   Copper
3. *Non-metallic*
   Limestone
   Asbestos
4. Location
5. Mining process
6. Impact
   on environment/
   on local people
7. Uses
   Who benefits/
   Who does not
8. What you think needs to be done
   Stop mining/
   Impose controls/
   Reclaim mined land/etc.

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Activity

Land Laid Waste

The common picture of a wasteland is a vast, dreary, uncultivated, uninhabited expanse More typical are the stretches of partially degraded, economically unproductive and ecologically unstable land. Such land is spread all over India. Some instances:—

* *Sonepat district:* Akbarpur-Barota is a relatively prosperous Haryana village in the heart of Green Revolution country in Haryana. Until the 1950s it was surrounded by forest so thick that people feared to venture into it at night. Today, the entire forest has disappeared as trees have been cut for firewood and the land cleared for cultivation. The result: water-eroded gullies, soil erosion, and bare patches of land.

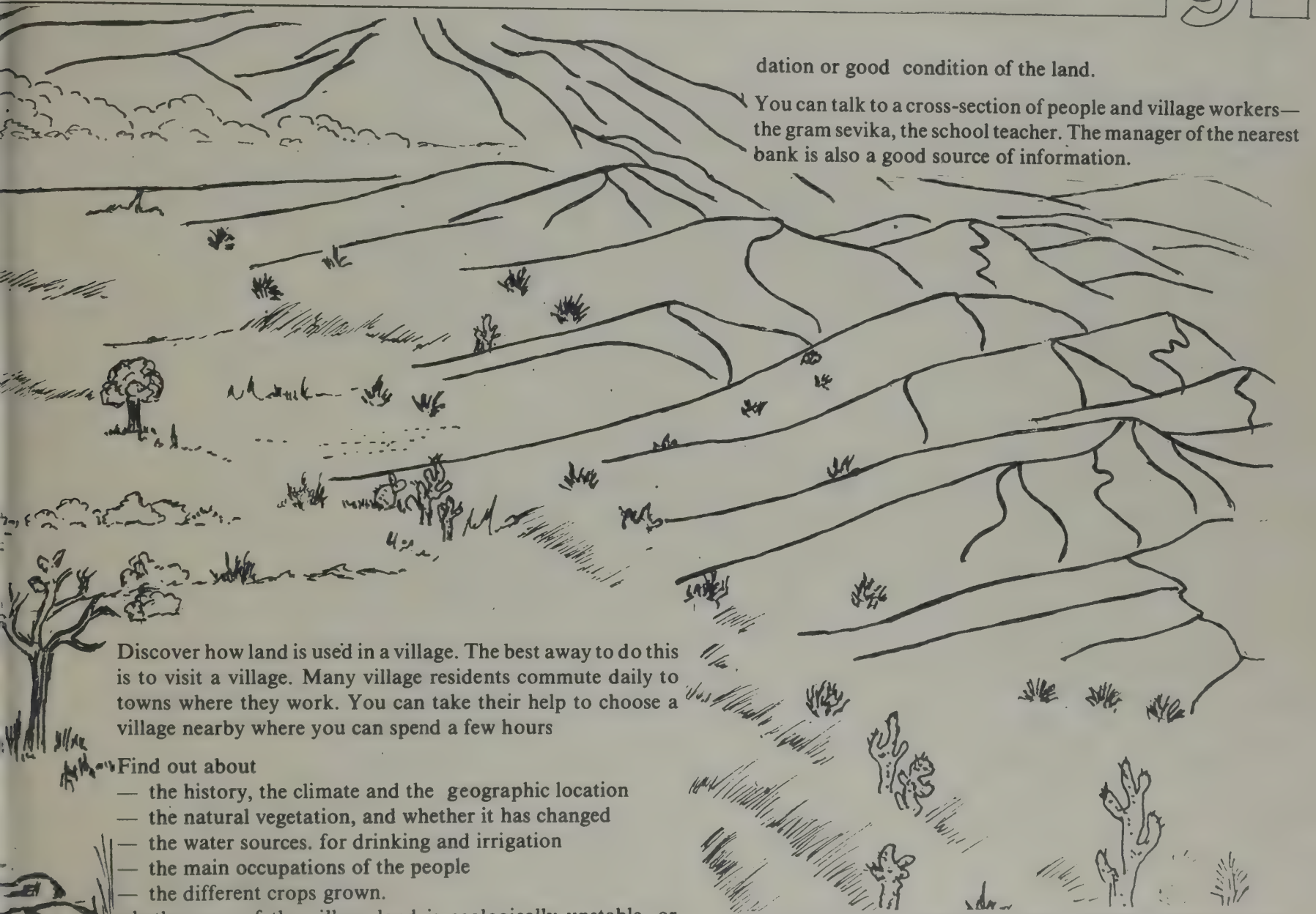
* *Gurgaon district:* In the lowlands below the fag end of the Aravalli range lies Rithora village in the Mewat region of Haryana, virtually untouched by the Green Revolution. Its problem: sandy soil and excessively brackish water, a repetitious cycle of floods and drought, and the stresses of an arid climate.

* *North Arcot district:* Under a Government programme Doraiswamy, a Harijan, has been given a fifth of a hectare of unproductive land in Guruvarajapalayam village in Tamil Nadu. He struggles to grow one crop of groundnut in a year, because the area is dry with little rain or surface water, and the soil is infertile. On his own he can do little to improve the soil quality.

* *Chamoli district:* Pulna village nestles on the banks of a tributary of the Alakananda in the Uttar Pradesh Himalayas—a cluster of thatched roofs, narrow green fields, some cattle and a sprinkling of goats. The quest for fodder is a major activity as

the nearest pastures have been intensely grazed. The grass species is poor because there is not enough time for the good grasses to regenerate.

* *West Kameng district:* In the Dhirang valley beyond Bomdilla in Arunachal Pradesh the vegetation on the mountain slope is periodically slashed and burned. Tribal women carefully prepare a plot by spreading oak leaves in an attempt to hold the humus in the soil, where they will grow maize, job's tears, millets and mustard together. Their attempts to enrich the soil are insufficient, and are thwarted because the cycle of shifting cultivation has become much shorter than in the past.



Discover how land is used in a village. The best away to do this is to visit a village. Many village residents commute daily to towns where they work. You can take their help to choose a village nearby where you can spend a few hours

Find out about

— the history, the climate and the geographic location
— the natural vegetation, and whether it has changed
— the water sources. for drinking and irrigation
— the main occupations of the people
— the different crops grown.

whether any of the village land is ecologically unstable, or economically unproductive, and the reasons for the degradation or good condition of the land.

You can talk to a cross-section of people and village workers—the gram sevika, the school teacher. The manager of the nearest bank is also a good source of information.

* Extracted from *"Developing India's Wasted Lands"* by Sunit Krishna. Centre for Science and Environment, 1986.

Activity

Lakeside ABC

Natural *wetlands* are not wastelands. *Bogs* are peatlands, "sinks" for plant remains, nutrients and carbon. *Swamps* and *marshes* seem similar but are as unlike each other as a forest and a prairie. Swamps are like a wet woodland, marshes are dominated by grasses. Most people know very little about India's wetlands. Here is an "A to Z" on India's wetlands, lakes and other water bodies. Try it and see how much you know.

A– A brackish (slightly salty) water lake near Quilon. It is Keralas's largest lake and was the site of a major railway accident.

B– A former royal hunting reserve in Rajasthan where thousands of birds used to be shot in a single day's hunting. This is a man-made wetland, not a natural one.

C– India's largest inland water body, covering 114,000 hectares, on the east coast.

D– A small freshwater lake, well known for its lake dwellers and their boat houses (Jammu & Kashmir). Now threatened and shrinking.

E– One species of this water bird almost became extinct because it was the fashion to wear the beautiful plumes (feathers) that the birds grew in the breeding season.

F– A small animal threatened because of the practice of (now banned) exporting its legs as a delicate food.

G– The Indian state which has the largest extent of natural wetlands, nearly 395,000 hectares, but most of it is brackish.

H– An amazing water plant which spreads rapidly over open water bodies. Some people think it is a nuisance, but it is an effective pollution filter, and can filter out toxic metals and pesticides within hours.

I– One species of this bird has the rare distinction of being the only waterside bird which has a bare head and neck.

J– Among the most spectacular of natural wonders is the sight of water plunging down a great height. These falls on the Sharavati river descend 250 m (830 ft.)

K– This enormous lake in Andhra Pradesh may have been in ages past a part of the Bay of Bengal. It includes islands and is surrounded by paddy fields and hamlets which are submerged when the lake floods.

L– A lake in Manipur with a floating swamp. It is the home of the thamin deer, which have special hooves that don't let them sink.

M– A group of tree species which have "breathing roots" and are adapted to saline water and muddy soil.

N – A water-bird sanctuary in Gujarat where both local and migratory birds collect

O – A water mammal

P – A brackish water lake on the east coast connected to the Bay of Bengal by a narrow opening, and affected by tides. The rivers which feed it have been dammed, so freshwater flows into the lake only in the monsoon.

R – A bird sanctuary on the banks of the Kaveri river; in June the pandanu trees overhanging the river are covered with nesting plovers, cormorants, grey herons, painted storks, darters, lapwings and other birds.

S – A large salt lake in Rajasthan, a state one doesn't normally think of in connection with wetlands.

T – This state has the largest number of small man-made tanks in the country, over 350. In ancient times there are many, many more—thousands by some accounts, but most have fallen into disrepair.

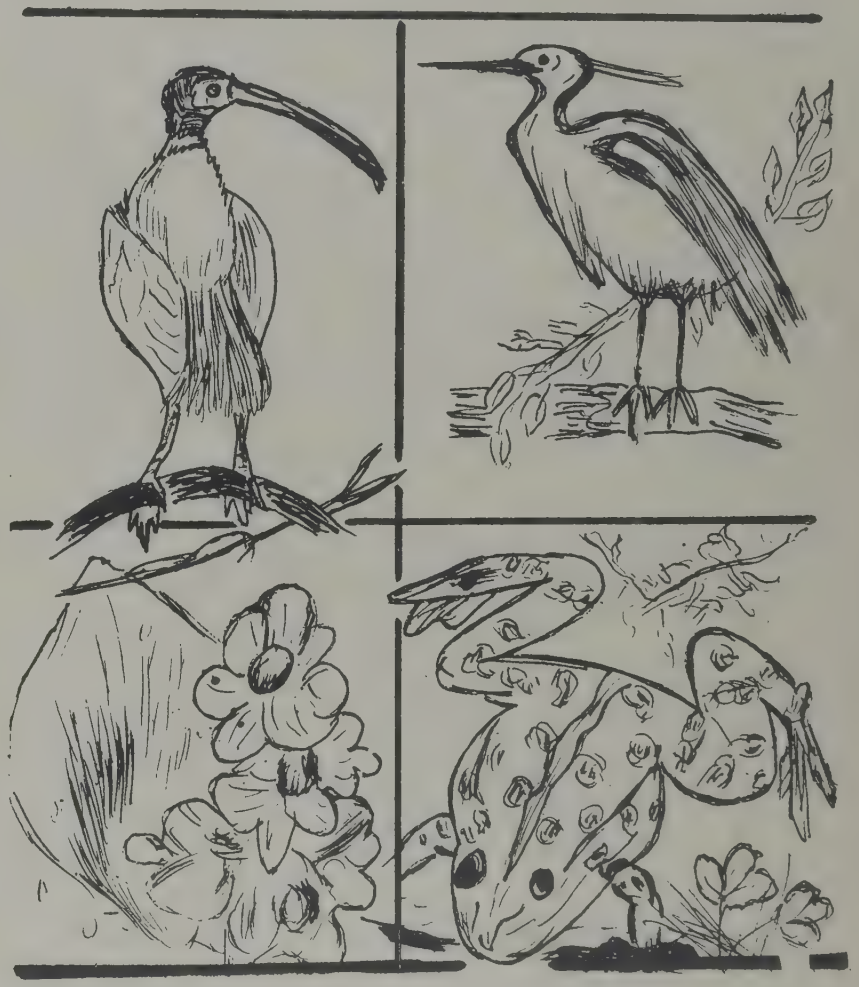
U – A small natural lake in West Champaran district, Bihar a state with many natural wetlands or chaurs.

V – A coastal, backwater swamp near Tanjavur in Tamil Nadu with a variety of waterbirds.

W – The largest lake on the River Jhelum in Kashmir.

Y – A large tank in Pune district, Maharashtra, one of many such tanks which provide drinking and irrigation water in a state with almost no significant natural wetlands left.

If you get half of these correct, by consulting an atlas, that's rather good. (Some of these may not be shown on ordinary school atlases.)



Answers : Ashtamudi, Bharatpur, Chilka, Dal, Egrets (Little Egret) Frogs* Gujarat, Hyacinth, Ibis (White Ibis), Jog, Kolleru, Loktak, Mangroves, Nalsarovar, Otter, Pulicat, Ranganthitoo, Sambhar, Tamil Nadu, Udaipur Lake**, Vedaranyam, Wular, Yesaji.

(Not to be confused with the lake in Udaipur City, Rajasthan)

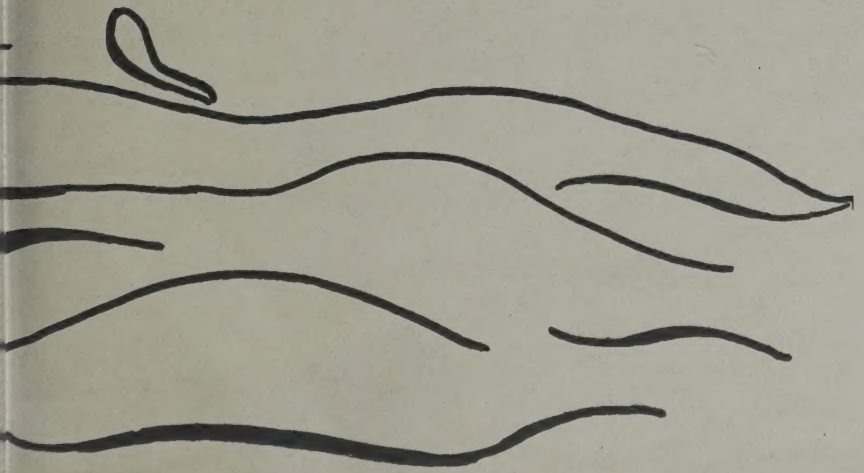
Activity

Sea of Trouble

Is it possible for a country to slide into the sea? The answer is, yes. Togo, a tiny country in West Africa, is doing just that. The waves from the sea have swallowed up 135 metres of the land on the coast—that is almost the length of 13 big buses standing one behind the other. Every year thousands of palm trees, which grow on the coast, disappear into the sea.

A part of the harbour of Lome, the capital of Togo, is also in danger from the advancing sea. Lome harbour is used not only by Togo but by other countries such as Mali, Burkina Faso and Niger, which do not have their own harbours.

Why is Togo sliding into the sea? One reason is that in the neighbouring country, Ghana, a dam has been built on the river Volta. The dam blocks the silt which used to be brought down by the river to the sea. The silt used to be deposited all along the coast, replacing the land eaten up or eroded by the sea. Now the dam prevents the silt from reaching the coast. Benin, another small country adjacent to Togo, is also threatened.



Many parts of the Indian coast are also being eroded by the sea. Imagine that your school or home is on a threatened coast, and you know that in a few years the place will be swallowed up by the advancing sea. Describe your feelings, or write a dialogue between two classmates or two members of your family to show how they feel about this.

Help children to understand that silt is neither good nor bad—it all depends on where it is. Crops grow on the fertile silt of river banks, and silt helps to build coasts. But too much silt in a reservoir, lake or harbour makes it shallower and interferes with its purpose.

Activity 12

Wet not Waste!

Wetlands are among the most productive and threatened ecosystems. The marshes, swamps and floodplains upon which were founded the great civilisations of Egypt, Mesopotamia and Indo-China, and which continue today to support rural communities throughout the world, are menaced by drainage, reclamation and pollution. Many have already been lost.

It is sadly ironic that as we sought to exploit the riches of these habitats, we have unwittingly destroyed them. Unconscious of their fragility we have, in our attempt to increase productivity, so disturbed the natural system that productivity has declined in several places. Yet if we are to feed our growing population we must try again to utilise these wetland resources. We must not only harvest their natural production but also examine their potential for agriculture and aquaculture.

But ... we should approach these questions in a way which takes account of the complexities and value of the ecosystems which we seek to exploit. Development should take account of the ecological structure of these systems if we are to continue to reap benefits from them on a sustainable basis.

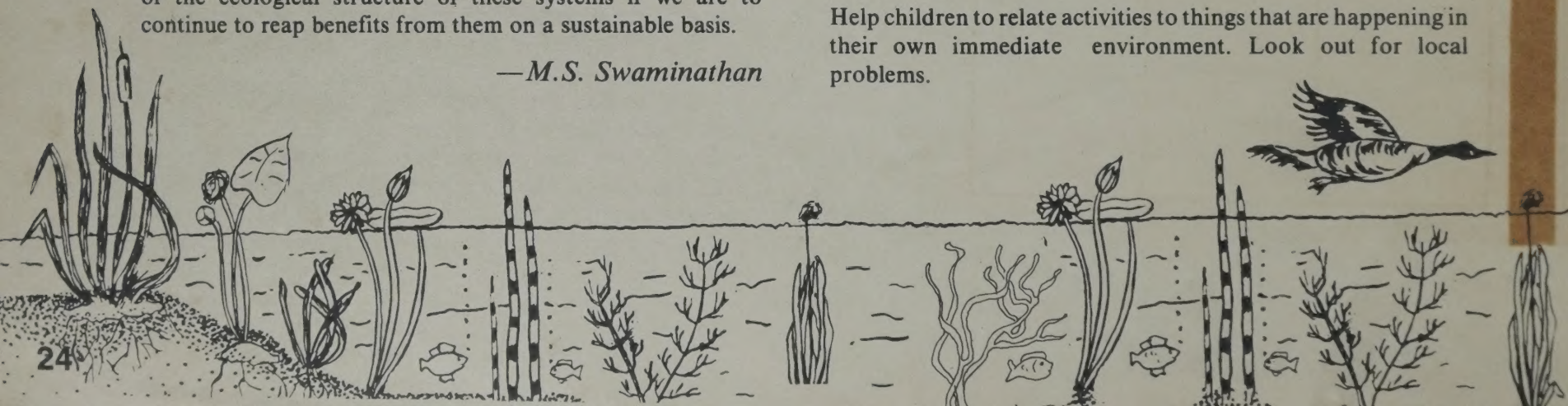
—M.S. Swaminathan

It's hard to walk through a wetland and most people wouldn't even try! Here, land and water meet to make some of the truly wild, haunting places of the world. Swamps, bogs and marshes, lakes and jheels and estuaries are home to an amazing variety of plants, animals, birds, reptiles and insects. Otters, curlews and crocodiles, turtles and frogs, beautiful swamp deer and many more creatures live in wetland areas. Till recently people left most wetlands alone. But now as more and more people need more and more land to build on and to grow food or graze cattle, wetlands are being drained or filled in or used as dumping grounds and polluted. Birds and animals who depend on wetlands are losing the only home they know. And where wetlands have been tampered with, human beings have soon been threatened with floods and drought.

—Target magazine

Suppose that a natural, stream-fed pond in your locality is drying up, because the stream is being blocked for the construction of houses. Write a letter to the Editor of a newspaper, expressing why you are concerned and suggesting what should be done.

Help children to relate activities to things that are happening in their own immediate environment. Look out for local problems.



SUBJECT WISE KEY TO ACTIVITIES

Shikshamitra
EDUCATION RESOURCE CENTRE
62B, Alipore Road, Kolkata -700027
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RETURN DATE SLIP

DUE DATE	DUE DATE	DUE DATE

ACTIVITY NUMBERS

SCIENCE	HISTORY	CIVICS	GEO-GRAPHY	MATHS	GAMES & QUIZ	SPECIAL PROJECTS
5,7,8,10			1,3,4,5		8	10
1,2,3,4, 5,6,7,8, 9,10,11			12	9	3,5,8,9	12
3,4,5,6, 7,7a	5	3	2,4,5,6 8,9,10,11		2,10	12
3,4,5,8 10	4,12	6,7,9,10	6,7	5	11	
2,3,5,7 9,10,12		11			5	12
6,7,2 .	1,4,9,10	3,5,8 10,11,12	1,9	3,8	12	11
3,4,5,6 10,11		2		4	4	11,12
6,8,10,11	5,6,8,9 10,11,12		3,5,6	4	9	8,12

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